What BlockChain and Ledger Technology Can Do For Exchange Traded Products

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New Technologies Will Blur the Lines Between ETFs, Mutual Funds, and Separate Accounts

Blockchain and Ledger Technologies have the potential to deliver the seemingly impossible – the scale and liquidity of large funds combined with the individualized returns of separate accounts.

The exchange traded product space continues to develop and launch novel and useful tools despite the limitations inherent in a U.S. settlement system which predates the modern ETF by decades. "T+3" settlement combined with the limitations of "street name" ownership have precluded many types of fund innovation, and in particular structuring over the liability side of the fund's balance sheet. Because of this asset-only orthodoxy, few have ever asked the

question, "*what can be achieved if we apply fund management techniques to both the assets and the liabilities of a fund?*" The answer is quite a lot.

Leveraged Returns and Where Does the Multiplier Go?

One of the most pronounced limitations in today's exchange traded market can be found in leveraged and inverse products. Consider that without the need to clear daily P&L results and re-strike leverage for tomorrow's investor, there's no school of investing which favors daily rebalancing - investors who go long AAPL or short MSFT look to execute their trades over a specific number of shares or specific dollar value as opposed to a floating/compounding/de-leveraging arrangement.

Daily rebalancing of fund assets disrupts investor returns, increases transaction expenses, and may unnecessarily contributes to market volatility; in fairness, leveraged and inverse ETFs and ETNs thoroughly disclose their day-by-day return limitations, and over most short periods, the undesirable effects of daily rebalancing are small.

For investors putting on leveraged trades, the effect of how the leverage is achieved means everything. The difference in the two equations below, RETURN(PRIME) and RETURN(ETP), can mean materially different results for the tactical investor.

The leverage an institutional investor achieves through a traditional prime brokerage arrangement or a non-rebalancing fund is consistent with RETURN(PRIME), where R(n) is the return for day "n":

RETURN(PRIME) = LEVERAGE x [-1 + (1 + R1) x (1 + R2) x (1 + R3) x .....]

In contrast, the leverage an exchange traded product buyer achieves through a conventional ETN or ETF is calculated as follows:

RETURN(ETP) = -1 + (1 + LEVERAGE x R1) x (1 + LEVERAGE x R2) x (1 + LEVERAGE x R3) x .....)

Looking at a recent market example, using the daily returns of a 3-times leveraged WTI crude oil futures index over

August 2015, RETURN(PRIME) indicates a gain of over 8%, while RETURN(ETP) indicates a loss of approximately 1%.

Because most investors and traders plan on holding positions over more than a single trading day, and because investors and traders continue to prefer fund products over alternative instruments, this area remains fertile ground for commercialization.

Why Must the Conventional Inverse and Leveraged ETF/ETN Rebalance its Positions Daily?

The following is a simplified 2-day example which illustrates why a conventional leveraged exchange traded product rebalances its positions daily.

Assume at the close of 1/5/15, a single investor enters an order for $100 of a 3X-leveraged ETF, where the share price is $10 and the order is for 10 shares ("Day1 Investor"); our $100 order will cause the ETF to execute an asset position equivalent to $300 (i.e. "3X"). Rolling forward to the close of business on 1/6/15, assume that the return on the assets is 8.33% - our ETF trading price should be approximately $12.50 (3 x 8.33% applied to a $10 opening price), and our assets position is $325, and our shareholder's value is $125.

For the second and last step in our example, assume that a second investor ("Day2 Investor") submits a $100 order on the close of 1/6/15 when the share price is $12.50 for 8 shares. To summarize, we now have Day1 Investor in for $100 with a 25% gain (3 x 8.33%), and Day2 Investor just having acquired 8 shares for $100.

Examining the ETF's leverage going into the next trading day (1/7/15), the ETF has an asset position of $625 (our first day's position of 300 with a 8.33% gain, plus another 300), and the ETF has an aggregate shareholder's equity position of $225 (Day1 Investor's position of 100 with a 25% gain, plus the Day2 Investor's position of 100). The leverage measure is then simply 625 (assets) divided by 225 (shareholder's equity) or 2.77x - materially below the ETF's stated leverage of 3x.

To restrike the leverage to 3x, our ETF leverages up the day1 $25 asset gain such that it is also leveraged 3x, so

assets go to $675 ($300 plus 3 times $25, plus the $300 relating to Day2 Investor), and the ETF's final leverage position is $675 over $225 or "3x". Note that shareholders's equity remains unchanged from $225, because the additional market exposure is achieved entirely through leverage.

Part of the "cost" of the daily rebalancing process comes from causing the fund to increase assets in an already up-market (i.e. a "buy high" move). If the market goes down 8.33% from here, our share price will drop to $9.375 (assets of $675 adjusted downward by 8.33%, further adjusted for $450 of leverage). So while our Day1 Investor might have expected a net 2% loss (e.g. RETURN(PRIME)), the Day1 Investor actually realizes an ETF loss of 6.25%.

What Happens if We Rebalance the ETF's Shares Rather Than Its Assets in This Sample Example?

It's illustrative to begin with the constraints of ETF design:

1. The net asset value (NAV) of the fund has to equal the aggregate value of the assets minus the liabilities,
2. The aggregate sum of shareholder claims must equal the NAV, and
3. The shareholder claims (a.k.a. the "shares") should be universal and indistinguishable with one published price and readily tradable on any exchange

While we typically think of ETFs in terms of share price, shares outstanding, and NAV, there are no real constraints relating to share counts - and share price is simply an artifact of share count. So the question remains - *what can we do if we manage or rebalance share counts rather than assets?*

Below we recreate the two-day example, but instead of rebalancing assets, we rebalance share counts similar to how a mutual fund adjusts share counts.

The Share Count Alternative

Recall in the example above, after the Day2 Investor entered our ETF for 8 shares at $12.50 each ($100), we found that the fund was under-leveraged with an

aggregate leverage of 2.77x rather than the target of 3x so we added another $50 (an additional 8%) to the assets to increase the leverage. What if, instead of increasing assets (i.e. "buying high"), we rebalanced share counts in response to market moves? As is demonstrated below, RETURN(PRIME) results can be generated by aligning our fund's share counts with NAV percentages.

Restating the Day1 Investor position, the Day1 Investor owns 10 shares at an original cost of $10 per share, and once assets have increased by 8.33%, the Day1 Investor's position is 10 shares at $12.5. Restating the Day2 Investor position, the Day2 Investor owns 8 shares at an original cost of $12.5.

Assets Have Moved Up 8.33% & Fund Price per Share is $12.50 3x Leverage

Continuing with the earlier example, day 2 is a down 8.33% day, and as noted in the immediately following table, the % of shares and % of NAV have deviated which triggers a share count rebalancing under this approach (i.e. each shareholder or shareholder group's % NAV is not equal to their % Shares...56.63% vs 55.56%).

Assets Have Moved Up 8.33%, Then Down 8.33% - 3x Leverage

Share Count Rebalancing is Executed in 2 Basic Steps:

One: take the lowest % NAV (group or investor) and divide it into the related number of shares in order to determine the revised share count for the entire fund: 8 / 0.4337 = 18.44 – the fund requires a shares rebalancing of 0.44 shares from 18 to 18.44 (this simplified example retains fractional shares)

Two: Distribute shares as required to cause the share percentage ownership to equal the % NAV ownership for each investor or investor group (e.g. investors with the same acquisition date, record date, tax lot date, etc.), subject to the condition that an investor or investor group's

share count will never decline – simply multiply 18.44 and the % NAV for each investor or group of investors. The final result is in the following table where rebalanced-changed cells are shaded. The new fund share price is $9.38 [(297.92 + 275.00) – (200 + 200)]/18.44:

Assets Have Moved Up 8.33%, Then Down 8.33% and Price per Share of $9.38 - 3x Leverage

Now check the system for RETURN(PRIME) results:

Day1 Investor: (10.44 x $9.38) / $100 – 1 = -2% **Ok**

Day2 Investor: (8 x $9.38) / $100 – 1 = -25% **Ok**

What Happens When Either the Day1 or Day2 Investor Sells?

The sold shares simply get tagged to the new acquisition dates which determines the targeted return (i.e. RETURN(PRIME)) and the share distribution entitlement for that return.

What Happens If the Index Has a Large Move Which Wipes Out a Shareholder's Equity?

If the net value of the equity position relating to a Day"X" investor or investor group falls through a threshold (e.g. <50%), that group's asset position will be rebalanced to the current market – the same process which occurs daily in conventional leveraged funds.

Arrangements such as the share-based rebalancing described above can be implemented in a mutual fund format, and as settlement systems become more accommodating, the arrangement should be exportable to the ETF and ETN marketplaces. For readers looking for more detail in the system and the particulars of its implementation, see United States Patent No. 8,630,935.

Summary

In this brief example, a wholly different kind of fund can be launched where the only new data requirement is the acquisition dates of outstanding shares - importantly we do not need to identify or track any beneficial owner

information. Basic corporate action techniques, such as the shares rebalancing described above, will enable fund sponsors to offer the liquidity and benefits of large scale funds all while delivering customized returns. While this technique, and similar ETF enhancements can be implemented today in a mutual fund format, we expect new settlement and operation technologies to blur product boundaries and expand product options.

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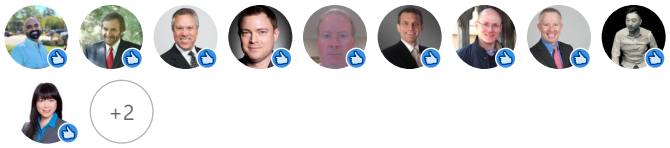

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Nice article Jack - thanks for sharing. While I was at Lehman I spent a fair amount of time trying to address the daily reset price anomalies that occur with certain leveraged and inverse ETFs. I appreciate your thinking on the matter.

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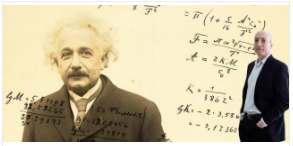

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